XXXVII International Enlarged Sessions of the Seminar of Ilia Vekua Institute of Applied Mathematics of Ivane Javakhisvili Tbilisi State University
April 19-22, 2023
Tbilisi

PROGRAM

Opening - April 19, Wednesday, 14:00
Ilia Vekua Lecture Hall in VIAM

Organizing Committee

The peer-reviewed manuscripts will be published. The source tex and the corresponding pdf files of the English version of the talk, prepared using the template (information how to prepare an article, together with a LaTeX template is available for download from http://www.viam.science.tsu.ge /en_ses.htm) and not exceeding four A4-format pages should be uploaded in the system
http://www.viam.science.tsu.ge/userspace/login
before May 31, 2023.

Opening of the Seminar will start on April 19, 2023 at 14:00 at I. Vekua Institute of Applied Mathematics (University str. 11, 0186 Tbilisi, Georgia).

Participating organizations and independent research units

- A. Razmadze Mathematical Institute of I. Javakhishvili Tbilisi State University (Razmadze Institute of TSU)
- A. Tsereteli Kutaisi State University
- European School
- Georgian National University (SEU)
- Georgian Technical University (GTU)
- Gori State University
- I. Javakhishvili Tbilisi State University (TSU)
- Ilia State University
- International Black Sea University
- I. Vekua Institute of Applied Mathematics of I. Javakhishvili Tbilisi State University (Vekua Institute of TSU)
- Kutaisi International University
- Niko Muskhelishvili Institute of Computational Mathematics of the Georgian Technical University (Muskhelishvili Institute of GTU)
- Sokhumi State University
- University of Georgia
- Vladimir Chavchanidze Institute of Cybernetics of the Georgian Technical University (Chavchanidze Institute of GTU)
- St. Andrews Georgian University
- (EMI), Universit´e Sultan Moulay Slimane, Beni-Mellal
- Laboratoire de Mathematiques Jean Leray, Nantes Universit´e, Nantes
- Mathematical Institute of the University of Vienna, Vienna, Austria
- Joint Institute for Nuclear Research, Dubna Moscow region, Russia
- Stevens Institute of Technology, Hoboken, USA
- University of Antwerp, Department of Biosciences Engineering, Belgium
- University of Salerno, Italy

Wednesday, April 19

Ilia Vekua Lecture Hall

14:00   **Opening**

Section of Mathematical Logic and Foundations

Chairs: Alexander Kharazishvili, Roland Omanadze
Co-chair: Archil Kipiani

Thursday, April 20
Room № 111 (VIAM)

12:00 - 12:20 Thilo Weinert (Mathematical Institute of the University of Vienna, Vienna, Austria)
On provable inequalities between cardinal characteristics of the continuum

12:20 - 12:40 Antonio Di Nola[1], <u>Revaz Grigolia[2]</u>, Giacomo Lenci[1], Gaetano Vitale[1]
([1]University of Salerno, Salerno, Italy, [2]TSU)
Dynamic intuitionistic logic

12:40 - 13:00 <u>Irakli Chitaia</u>, Roland Omanadze (Department of Mathematics, Faculty of Exact and Natural Sciences of TSU)
Notes on nowhere simple sets and conjunctive reducibility

13:00 - 13:20 Mriam Beriashvili (Vekua Institute of TSU, GTU)
Some applications of Fraïssé limit

13:20 - 13:40 <u>Mariam Gobronidze[1]</u>, Archil Kipiani[2] ([1]Vekua Institute of TSU, [2]Department of Mathematics, Faculty of Exact and Natural Sciences of TSU)
On a problem of group representation

Break 13:40 – 14:10

14:10 - 14:30 Tamar Kasrashvili (Vekua Institute of TSU, TGU)
On various aspects of definitions of equidecomposability of sets

14:30 - 14:50 Shalva Beriashvili (SEU)
On some inequalities of geometric type

14:50 - 15:10 Marika Khachidze (Ph.D. student of TGU)
On almost non-invariant sets

15:10 - 15:30 Tengiz Tetunashvili (Vekua Institute of TSU, GTU)
On the stability question for one problem of combinatorial geometry

Section of Applied Logics and Programming

Chair: Matthias Baaz (Austria)
Co-chair: Jemal Antidze, Besik Dundua, Mikheil Rukhaia

Wednesday, April 19
Room № 208 (VIAM)

15:00 - 15:20 Anriette Michel Fouad Bishara[1], Lia Kurtanidze[1,2], <u>Mikheil Rukhaia</u>[1], Lali Tibua[1,2] ([1]Vekua Institute of TSU, [2]SEU)
Unranked Probabilistic Theory: Project Presentation
15:20 - 15:40 Merium Hazem Anwar Labib Bishara (International Black Sea University)
Reasoning in logic with unranked and probabilistic primitives
15:40 - 16:00 Merihan Hazem Anwar Labib Bishara (International Black Sea University)
Non-classical techniques in inductive logic programming with statistical relational artificial intelligence
16:00 – 16:20 Besik Dundua (Kutaisi International University, Vekua Institute of TSU)
Higher-Order Unification with Regular Types

Section of Algebra, Geometry and Number Theory

Chairs: Mikhail Amaghlobeli, George Khimshiashvili, Teimuraz Vepkhvadze, Malkhaz Bakuradze
Co-chair: Ketevan Shavgulidze

Wednesday, April 19
TSU, XI building, Room № 318

15:00 - 15:20 <u>**Mikheil Amaglobelli**[1]</u>**, Alexei Myasnikov**[2] ([1]Department of Mathematics of TSU, [2]Stevens Institute of Technology, Hoboken, USA)
On the varieties of exponential MR−groups

15:20 - 15:40 Teimuraz Vepkhvadze (Department of Mathematics of TSU)
Integers represented by binary forms belonging to multi-class genera

15:40 - 16:00 Ketevan Shavgulidze (Department of Mathematics of TSU)
On the spaces of spherical polynomials and generalized theta-series for quadratic forms of five variables

16:00 - 16:20 Tengizi Bokelavadze (Department of Mathematics, Akaki Tsereteli State University)
On the lattice isomorphisms of 2-nilpotent W-power groups and Lie algebras

16:20 - 16:40 Gocha Todua (European University)
$T(Vn)$ *tangent bundle* $T(T(Vn))$ *tangent bundle's I-forms*

16:40 - 17:00 Ana Diakvnishvili (Ilia State University)
On an explicit construction of bicentric quadrilaterals

17:00 - 17:20 Tamar Kvirikashvili (Department of Mathematics of GTU)
On the fundamental theorem of geometric algebra over SF-rings

Thursday April 20
(Online, using Zoom system, ID number: 984 848 2593)

16:00 - 16:20 Johan Gielis (University of Antwerp, Department of Biosciences Engineering, Belgium)
A note on representing dimensions

16:20 - 16:40 Ilia Tavkhelidze (Department of Mathematics of TSU)
About "cutting" of the generalized Möbius-Listing surfaces and bodies

16:40 - 17:00 Giorgi Khimshiashvili (Ilia State University)
Extremal problems in Kendall shape spaces

Section of Real Analysis

Chairs: Ushangi Goginava, Leri Gogoladze
Co-chair: Ana Danelia

Thursday, April 20
Ilia Vekua Lecture Hall

15:00 - 15:20 Nika Areshidze (Department of Mathematics of TSU)
Approximation of Nörlund means with respect to Walsh system in Lebesgue spaces

15:20 - 15:40 <u>Mariam Beriashvili</u>[1,2], Aleks Kirtadze[2,3] ([1] Vekua Institute of TSU, [2]GTU,[3] Razmadze Institute of TSU)
On the existence of an invariant measure in an infinite-dimensional Polish vector space

15:40 - 16:00 Larry Gogoladze, <u>Giorgi Cagareishvili</u> (I. Javakhishvili Tbilisi State University)
The optimal convergence factors for general Fourier coefficients

16:00 - 16:20 <u>Irakli Japaridze</u>[1], Giorgi Oniani[2] ([1]Departament of Mathematics, Akaki Tsereteli State University[2], School of Computer Science and Mathematics,Kutaisi International University)
On the integrability of multi-dimensional rare maximal functions

16:20 - 16:40 Shakro Tetunashvili[1,2], <u>Tengiz Tetunashvili</u>[1,3] ([1]GTU, [2]Razmadze Institute of TSU, [3]Vekua Institute of TSU)
On universality of Rademacher series

16:40 - 17:00 Rusudan Meskhia (Department of Mathematics of TSU)
Absolute convergence of double Fourier trigonometric series

17:00 - 17:20 <u>Giorgi Tutberidze</u>[1], Vakhtang Tsagareishvili[2] ([1]The University of Georgia, [2]I. Javakhishvili Tbilisi State University)
Some problems of convergence of general Fourier series

17:20 - 17:40 Leri Gogoladze (I. Javakhishvili Tbilisi State University)
Absolute convergence of general Fourier series

Section of Complex Analysis and Applications

Chair: Grigor Giorgadze
Co-chair: George Akhalaia

Wednesday, April 19
Ilia Vekua Lecture Hall

The session is partially dedicated of the presentation of results
within the framework of Shota Rustaveli Science foundation grant N 22-354

15:00 - 15:20 <u>Giorgi Makatsaria</u>[1], Nino Manjavidze[2], Giorgi Akhalaia[3] ([1]Institute of Cybernetics of GTU, [2]Ilia State University, [3]Vekua Institute of TSU)
Generalized meromorphic functions

15:20 - 15:40 Nino Bregvadze (TSU)
The accessory parameter problems

15:40 - 16:00 Mariam Chakhoiantsi (TSU)
Riemann-Hilbert boundary value problem with shift for generalized analytic functions

16:00 - 16:20 Nikoloz Avazashvili (Vekua Institute of TSU)
On Carleman-Vekua's method of regularization of singular integral equation

16:20 - 16:40 Giorgi Kakulashvili (TSU)
On the algorithm of integer partition

16:40 - 17:00 Irakli Sikharulidze (TSU)
The Abel-Jacobi theorem

17:00 - 17:20 <u>Gia Giorgadze</u>, Gega Gulagashvili (Vekua Institute of TSU)
On solvability condition of the Rieman-Hilbert boundary problem by quadratures

17:20 - 17:40 Nugzar Makhaldiani (Joint Institute for Nuclear Research, Dubna)
Renormstatistics in multiparticle production processes

Section of Ordinary Differential Equations and Optimal Control

Chairs: Roman Koplatadze, Tamaz Tadumadze
Co-chair: Tea Shavadze

Friday, April 21
Room № 111 (VIAM)

13:00 - 13:20 <u>**Tamaz Tadumadze[1], Abdeljalil Nachaoui[2], Mourad Nachaoui[3]**</u> ([1]Vekua Institute of TSU, Department of Mathematics of TSU, [2]Laboratoire de Mathematiques Jean Leray, Nantes Universit´e, Nantes, [3](EMI), Universit´e Sultan Moulay Slimane, Beni-Mellal)
Sensitivity coefficients of a controlled functional-differential model of the immune response considering of the mixed initial condition and variation of the initial moment

13:20 - 13:40 <u>**Tea Shavadze[1], Ia Ramishvili[2]**</u> ([1]Vekua Institute of TSU,[2] Department of Mathematics of GTU)
On the well-posedness of the Cauchy problem for one class of controlled neutral functional differential equation considering perturbation of the initial data

13:40 - 14:00 **Medea Iordanishvili** (Department of Computer Sciences of TSU, St. Andrews Georgian University)
Local presentation formulas of solution and optimization problems for the controlled functional-differential equation with the mixed initial condition

14:00 - 14:20 **Akaki Gabelaia** (Department of Computational Matematics of GTU)
Predicting the spread of the coronavirus (covid-19): challengees and practical experience

14:20 - 14:40 **Besarion Anjaparidze** (Department of Mathematics of TSU)
On the criterion of well-posedness of the Cauchy problem with weight for systems of linear ordinary differential equations with singularities

14:40 - 15:00 <u>**Nika Gorgodze[1], Eka Bokhua[2]**</u> ([1]Department of Mathematics of Akaki Tsereteli Kutaisi State University, [2]Department of Mathematics of TSU)
On the existence of an optimal element for the quasi-linear neutral optimal problem with the two types controls and several delays

15:00 - 15:20 <u>**Phridon Dvalishvili, Lela Alkhazishvili**</u> (Department of Computer Sciences of TSU)
Optimal control of one marketing relation model considering demand-supply linear functions and varable delay

15:20 - 15:40 **Roman Koplatadze** (Department of Mathematics of TSU, Vekua Institute of TSU)
On the oscilatory properties of the second order Emden-Fowler type diffrence equations with deviating argument

Section of Partial Differential Equations

Chairs: Temur Jangveladze, Sergo Kharibegashvili, David Natroshvili
Co-chair: Zurab Kiguradze

Wednesday, April 19
Room № 133 (VIAM)

15:00 - 15:20 Teona Bibilashvili (Faculty of Informatics and Control Systems of GTU)
A boundary value problem for a class of higher-order nonlinear hyperbolic equations

15:20 - 15:40 Mikheil Gagoshidze (Vekua Institute of TSU)
Numerical solution of one nonlinear partial differential multidimensional system

15:40 - 16:00 Nino Mzhavanadze (Department of Mathematics of TSU, Vekua Institute of TSU)
On the numerical solution of one system of nonlinear partial differential equations

16:00 - 16:20 Irine Sigua[1], <u>Ana Dzirkvadze</u>[2] ([1]Department of mathematics of GTU, [2]Faculty of Informatics and Control Systems of GTU)
A form of a general solution for one class of high-order hyperbolic equations and some of its applications

16:20 - 16:40 Tamar Paikidze (Department of Mathematics of TSU, Vekua Institute of TSU)
On the initial-boundary value problem of the nonlinear fourth order integro-differential model and its corresponding difference scheme

16:40 - 17:00 Teimuraz Chkhikvadze (Department of Mathematics of TSU, Vekua Institute of TSU)
Investigation of the fourth-order nonlinear integro-differential equation and its corresponding difference scheme

17:00 - 17:20 Temur Jangveladze (Vekua Institute of TSU, GTU)
On the system of Maxwell's nonlinear partial differential equations

Section of Probability Theory and Mathematical Statistics

Chairs: Elizbar Nadaraia, Omar Purtukhia

Wednesday, April 19
TSU, XI building, the office of prof. Gvanji Mania № 335

15:00 - 15:20 Petre Babilua[1], <u>Elizbar Nadaraya</u>[1,2] ([1]Department of Mathematics of TSU, [2]Vekua Institute of TSU)
On the Nadaraya-Watson type nonparametric estimator of the Poisson regression function

15:20 - 15:40 Kartlos Kachiashvili (Faculty of Informatics and Control Systems of GTU, Vekua Institute of TSU, N. Muskhelishvili Institute of Computational Mathematics of GTU)
Quasi-optimal rule of testing directional hypotheses

15:40 - 16:00 George Giorgobiani, <u>Vakhtang Kvaratskhelia</u> (N. Muskhelishvili Institute of Computational Mathematics of GTU)
On the subgaussian random elements in a Banach space

16:00 - 16:20 Vakhtang Jaoshvili[1], Valeriane Jokhadze[2], <u>Omar Purtukhia</u>[3] ([1]Vladimir Komarov Tbilisi School of Physics and Mathematics N199, [2]Faculty of Economics and Business of TSU, [3]Department of Mathematics and A. Razmadze Mathematical Institute of TSU)
Nonlinear filtering problem and martingale representation

16:20 - 16:40 <u>Zurab Kvatadze</u>[1], Beqnu Parjiani[1], Tsiala Kvatadze[2] ([1]Department of Mathematics of GTU, [2]International Black Sea University)
On conditional distribution of m dependent vector sum

16:40 - 17:00 Besarion Dochviri, <u>Zaza Khechinashvili</u> (Department of Mathematics of TSU)
American option with discounting

17:00 - 17:20 <u>Zurab Zerakidze</u>[1], Mimoza Tkebuchava[2] ([1]Gori State University, [2]TSU)
Some properties Haar statistical strustures in Hilbert space of measures

17:20 - 17:40 Zurab Zerakidze[1], <u>Tamar Chkonia</u>[2] ([1]Gori State University, [2]TSU),
Some properties Haar statistical strustures in Banach space of measures

17:40 - 18:00 <u>Petre Babilua</u>[1], Elizbar Nadaraya[1,2], Mzevinar Patsatsia[3] ([1]Department of Mathematics of TSU, [2]Vekua Institute of TSU, [3]Sokhumi State University)
On some properties of one nonparametric estimate of the Poisson regression function

Section of Mechanics of Continua

Chairs: George Jaiani
Co-chair: Natalia Chinchaladze

Wednesday, April 19
Room № 111 (VIAM)

15:00 - 15:20 George Jaiani (Vekua Institute of TSU, Department of Mathematics of TSU)
A remark on relations of experimental results of J. Nikuradze and the Keldysh BVP

15:20 - 15:40 <u>Natela Zirakashvili</u>[1], Teona Zirakashvili[2,3] (Vekua Institute of TSU, [2]Ilia State University, [3]"Tbilisi Heart and vascular Clinic" LTD)
Study of the propagation of action potentials in heart tissue using cable equation

15:40 - 16:00 Edison Abramidze (N. Muskhelishvili Institute of Computational Mathematics of GTU)
Numerical analysis of the stressed state of parabolic rotational three layered shell

16:00 - 16:20 <u>Gia Avalishvili</u>[1], Mariam Avalishvili[2] ([1]TSU, [2]University of Georgia)
Investigation of three-phase-lag nonclassical Model of thermoelastic solids

16:20 - 16:40 Natalia Chinchaladze (Vekua Institute of TSU, Department of Mathematics of TSU)
A dynamical problem of zero approximation of hierarchical models for fluids

16:40 - 17:00 <u>Bakur Gulua</u>[1], Ucha Todria[2] ([1]Vekua Institute of TSU, [2]Sokhumi State University)
Basic boundary value problems for the plane theory of elasticity of porous Cosserat media for circular ring with voids

17:00 - 17:20 Roman Janjgava (Vekua Institute of TSU, SEU)
Approximate solution of some boundary value problems of stress concentration for perforated plates with voids

17:20 - 17:40 Giorgi Kapanadze (Vekua Institute of TSU, [2]Razmadze Institute of TSU)
On one problem of the plane theory of viscoelasticity for circular plate with a polygonal hole

17:40 - 18:00 <u>Kosta Svanadze</u> (Department of Mathematics of A. Tsereteli Kutaisi State University)
On the solution of the Bitsadze-Samarskii problem for the two-dimensional equation of states of the moment elasticity theory by variational method

18:00 - 18:20 Round Table

Section of Mathematical Modeling and Numerical Analysis

Chairs: Teimuraz Davitashvili, Jemal Rogava, Tamaz Vashakmadze
Co-chair: Archil Papukashvili

Wednesday, April 19
Room № 125 (VIAM)

15:00 - 15:20 Temur Chilachava, <u>Gia Kvashilava</u>, George Pochkhua (Sokhumi State University)
Mathematical model for the Proto-Kartvelian population dynamics
15:20 - 15:40 Nugzar Kereselidze (Sokhumi State University)
Mathematical and computer model of effective fight against disinformation
15:40 - 16:00 Nino Khatiashvili (Vekua Institute of TSU)
On the axi-symmetric fluid flow in case of small Reynolds number
16:00 - 16:20 <u>David Kaladze</u>, Luba Tsamalashvili (Vekua Institute of TSU)
On the exact solutions of the zakharov-kuznetsov dynamical equation in an electron-positron-ion plasma
16:20 - 16:40 <u>Archil Papukashvili</u>, Giorgi Geladze, Zurab Vashakidze, Meri Sharikadze (Vekua Institute of TSU)
On the numerical solution to J. Ball's beam equation in the case where the material's effective viscosity is dependent on its velocity
16:40 - 17:00 <u>Giorgi Buzhgulashvili</u>[1], Tamaz Vashakmadze[2] ([1]Master's student of Department of Mathematics Exact and Natureall Faculty of TSU, [2]Vekua Institute of TSU)
University on the approximate solution of the boundary value problem for ordinary differential equations

Thursday, April 20
Ilia Vekua Lecture Hall

13:00 - 13:20 <u>Teimuraz Davitashvili</u>, Giorgi Rukhaia (Vekua Institute of TSU)
Modeling the dynamics of a mixture of natural gas and hydrogen in pipeline
13:20 - 13:40 <u>Jemal Peradze</u>[1], Archil Papukashvili[2,3], Giorgi Papukashvili[4] , Meri Sharikadze[2]
([1]Faculty of Exact and Natural Sciences of TSU, [2]Vekua Institute of TSU, [3]School of Science and Technology the University of Georgia, [4]V. Komarovi no. 199 Public School)
On the solution of an initial-boundary value problem of a string
13:40 - 14:00 Giorgi Gobejishvili
The mathematical model of electron affinity (drive) and electrode potentian functional connection
14:00 - 14:20 Zviad Kalichava[1], Jemal Peradze[2], <u>Zviad Tsiklauri</u>[3] ([1]Muskhelishvili Institute of Computational Mathematics, [2]TSU, [3]GTU)
On the accuracy of the difference scheme for a nonlinear model of the dynamic beam
14:20 - 14:40 Jemal Rogava[1], <u>Zurab Vashakidze</u>[2] ([1]Faculty of Exact and Natural Sciences of TSU, [2]Vekua Institute of TSU)
On a local convergence of a symmetric three-layer semi-discrete scheme for the nonlinear dynamic string equation of Kirchhoff-type with time-varying coefficients